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Survey and populations of spiders and other arthropods in cucurbit and legume fields in Al-Kanater (Egypt)*

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Abstract

Survey on spiders and other arthropods inhabiting fields of four legume and five cucurbit crops, as well as seasonal abundance of spiders were investigated at Al-Kanater Agricultural Research Station during one year to find 16 spider families, of about 33 genera and 33 species. Spring showed the greatest number of spider taxa (29) followed by 22 in summer, while autumn recorded the lowest number (15). Other associated arthropods included three classes, 10 orders and about 40 genera, i.e. one order of Crustacea, three of Chilopoda (Myriapoda), and six of Insecta which included about 40 species in more than 33 genera and 22 families.

Keywords: Survey, Seasonal abundance, Spiders, Insecta, Chilopoda, Crustacea, Egypt.

Introduction

Spiders as predators play an important role in agroecosystems. They are considered a biocontrol agent against economic pests of various agricultural crops. Therefore, survey on spiders and other arthropods inhabiting fields of four legumes (peas, kidney bean, cowpea and broad bean) and five cucurbits (squash, cucumber, sweet squash, muskmelon, watermelon and watermelon intercropped with maize) crops as well as its seasonal abundance were investigated at Al-Kanater Agricultural Research Station during one year (October 2000 - August 2001). Kidney bean, squash and cucumber were subjected to survey twice a year in an agricultural rotation as summer and winter crops, while other crops were surveyed once. Watermelon was surveyed as monoculture and when intercropped with maize.

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Material and Methods

This study was carried out at Al-Kanater Agricultural Research Station, including nine vegetable crops of two botanical families. Four belong to Leguminosae and these are peas, *Pisum sativum* (from 11 November to 27 March), kidney bean, *Phaseolus vulgaris* (from 11 October to 14 February and from 20 March to 10 July), cowpea, *Vigna sinensis* (from 16 May to 21 August) and broad bean, *Vicia faba* (from 10 January to 29 May). The other five crops belong to Cucurbitaceae. They are squash, *Cucurbita pepo* (from 3 October to 13 December and from 10 April to 10 July), cucumber, *Cucumis sativus* (from 3 October to 29 November and from 10 April to 10 July), sweet squash, *Cucurbita maschata* (from 17 April to 10 July), musk melon, *Cucumis melo* var. *reticulat*a (from 29 May to 17 July) and watermelon, *Citrullus vulgaris* (from 17 April to 10 July). Watermelon was also intercropped with maize (from 8 May - 17 July).

Pitfall traps of plastic cups, each 8 cm in diameter and 11 cm deep were used to survey spiders and associated soil arthropods inhabiting investigated fields (Southwood, 1987). Six traps were used for every investigated vegetable crop, lasted for 48 hour/week and regularly applied for each crop depending on its duration. Captured arthropods were carefully stored for identification (Identification of spiders is the responsibility of the second author (HE)). Population of the spider families were assessed as percentage of the entire captured spiders in each crop. The family percentage less than 5% was categorized as rare (r); that of 5-33% = low occurrence (l); that of 33-66% = medium occurrence (m); and that of more than 66% was described as high occurrence (h).

A list of identified spider species, alphabetically arranged, is presented at the end of 'Results' section with authors and dates to avoid mentioning them inside the tables.

Results

Occurrence of spiders in the studied crops

The family Lycosidae proved to be the dominant among spider families where it had high occurrence (h) in fields of 11 of the 13 investigated vegetable crops (Table 1). This coincides with Hussein (1999) who reported that Lycosidae comprised 86.42% of the whole spider population in 8 vegetable crop fields. This may be due to the ecological abiotic and biotic factors in such vegetable crops that fit the requirements of members of this family, e.g. temperature, relative humidity, shelter, leaf texture and abundance and diversity of the pest prey species. However, the family Lycosidae recorded low occurrence in winter squash only (5.3%). This may be due to the cold temperature during winter season when large leaf area of squash plants completely shades the soil from sun.

The family Linyphiidae showed the second rank in occurrence. It recorded medium occurrence (m) in one crop (broad bean) and low occurrence (l) of the whole spider populations in 9 crops, i.e. winter and summer kidney bean, peas, winter and summer cucumber, winter and summer squash, muskmelon and sweet squash. It constituted 33.33% of the whole spider population in the broad bean field.

The family Theridiidae occurred in low percentages in only three fields of studied crops averaging 5.78, 6.52 and 5.69% in winter kidney bean, winter squash and summer squash respectively while it was rare in the other ten crops (Table 1).

It is worth noting that families Lycosidae, Linyphiidae, Philodromidae and Theridiidae occurred in all the 13 studied crop fields where Lycosidae were found in high percentage followed by Linyphiidae. This may be due to the fitness of the habitat of the vegetable crops for these spider families.

Table 1: Relative abundance of spider families in different studied vegetable crops during the study period.

Crops / Families	Legume Crops					Cucurbit Crops							
	Winter Kidney Bean	Peas	Broad Bean	Summer Kidney Bean	Cow Pea	Winter Cucumber	Winter Squash	Summer Cucumber	Summer Squash	Sweet Squash	Watermelon	Watermelon Intercropped	Muskmelon
Agelenidae	r	-	r	-	-	-	-	-	-	-	-	-	-
Araneidae	-	-	r	-	-	-	-	r	r	-	-	-	r
Dictynidae	-	-	r	-	-	-	-	-	-	-	-	-	r
Dysderidae	r	-	-	-	-	-	-	-	-	-	r	-	-
Gnaphosidae	r	r	r	r	r	r	-	r	r	r	r	r	r
Linyphiidae	l	l	m	l	r	l	l	l	l	l	r	r	l
Lycosidae	h	h	m	h	h	h	l	h	h	h	h	h	h
Miturgidae	r	-	-	r	r	-	-	-	-	-	-	-	-
Philodromidae	r	r	r	r	r	l	l	r	r	r	r	l	r
Pisauridae	r	-	r	-	-	-	-	-	-	-	-	-	-
Salticidae	-	r	r	r	r	r	-	r	-	r	r	r	r
Scytodidae	-	-	-	-	-	-	-	-	r	r	-	-	-
Sicariidae	-	-	r	r	-	-	-	-	-	-	-	-	-
Tetragnathidae	r	r	r	-	-	-	-	-	-	-	-	-	-
Theridiidae	l	r	r	r	r	r	l	r	l	r	r	r	r
Titanoecidae	-	-	-	-	-	-	-	r	r	-	-	-	-

r = rare (< 5%), l = low (5–33%), m = medium (33-66 %), h = high occurrence (> 66%).

The family Philodromidae was also found in low percentage, i.e. 5.67, 5.0 and 5.48 in 3 crops (winter cucumber, winter squash and watermelon intercropped with maize), while being rare in the other crops (Table 1). The other recorded families appeared in rare numbers associated with some crops and disappeared from others. Of these, the family Gnaphosidae which only disappeared from winter squash while Salticidae disappeared from winter kidney bean and winter and summer squash. It seems that there is a possible relation between squash and salticid spider disappearance.

The families Agelenidae, Dictynidae, Dysderidae, Pisauridae, Scytodidae, Sicariidae and Titanoecidae were found in only two crops from total 13 crops. Along the study period, two of these rare families Agelenidae and Pisauridae occurred only in winter kidney bean and broad bean while Scytodidae and Titanoecidae only appeared in summer season, titanoecids inhabited summer cucumber and summer squash and the scytodids occurred in summer squash and sweet squash (Table1).

Table 2: Occurrence of spider families, genera and species in legumes in Al-Kanater Agricultural Research Station.

Taxa	Winter Kidney Bean				Peas				Broad Bean				Summer Kidney Bean				Cowpea			
	♂	♀	J	TN	♂	♀	J	TN	♂	♀	J	TN	♂	♀	J	TN	♂	♀	J	TN
Agelenidae																				
Lycosoides sp.	1			1																
Tegenaria sp.									1			1								
Araneidae *									1			1								
Dictynidae *									1	2		3								
Dysderidae *Dysdera* sp.		1		1																
Gnaphosidae *					2	1	1	4	1			1							1	1
Micaria sp.	2			2	2		1	3							2	2	6			6
Setaphis subtilis	1			1	1			1					1			1				
Zelotes sp.									1	1		2	3			3	6	1	1	8
Linyphiidae *	7	2	1	10	15	13	2	30	16	8	5	29	5	9	2	16	2	4	3	9
Erigone dentipalpis					6	1		7	19	5		24	24	1		25	5			5
Gnathonarium dentatum	3			3					2	1		3	1			1				
Prinerigone vagans	2			2	8	1		9	4	1		5	10	1		11	1			1
Lycosidae *			34	34	1		34	35			22	22			30	30			85	85
Hogna ferox	1		1	2	3		1	4		1		1	4	1		5	9	1		10
Pardosa injucunda	1			1			1	1						2	2	2	2			2
Wadicosa fidelis	56	16		72	34	8	3	45	18	9		27	27	8	35	35	137	47		184
G1	11	1		12	50	17		67	30	7		37	117	21		138	69	25		94
G2									8			8	4	1		4	3			3
Miturgidae																				
Cheiracanthium sp.		1		1									1			1	1			1
Philodromidae																				
Thanatus albini	4			4	4			4	5	1		6	6	3	2	9	10	2	1	13
Pisauridae *									1			1								
Salticidae *					2	1		3	2			2	4	2	1	7	10	1		11
Menemerus sp.													1			1				
Sicariidae *Loxosceles* sp.									1	1		2	1			1				
Tetragnathidae *	1			1	2			2	6			6								
Theridiidae *		1	1	2													1			1
Steatoda erigoniformis	8			8	3	1		4	3			3	7			7	11	1		12
Total	112	24	37	173	133	43	43	219	119	37	27	183	218	48	35	301	263	83	91	447
Average	7.46	3.42	9.25	8.65	9.5	5.38	6.1	12.88	6.6	3.08	13.5	8.71	12.8	5.33	8.75	15.05	18.2	9.2	18.2	24.8
S.D.	13.5	5.15	14.28	16.4	14.06	6.08	11.4	18.8	7.89	2.75	8.5	10.53	27.8	6.2	12.27	29.9	35.6	15.25	33.4	46.8

Using total of 50, 162, 114, 96 & 84 pitfall traps in winter kidney bean, peas, broad bean, summer kidney bean and cowpea respectively.
J = Juveniles could not be identified to more than family level. * = Only identified to family level. TN = total number.

Table 3: Occurrence of spider families, genera and species in cucumber and squash in Al-Kanater Agricultural Research Station.

Taxa	Winter Cucumber				Winter Squash				Summer Cucumber				Summer Squash			
	♂	♀	J	TN	♂	♀	J	TN	♂	♀	J	TN	♂	♀	J	TN
Araneidae *										1		1		1		1
Gnaphosidae *	1			1												
Micaria sp.										1		1				
Setaphis subtilis		1		1										1		1
Synaphosus sp.										1		1				
Zelotes sp.									1	2		3		1	1	2
Linyphiidae *		4		4	1	3		4	6	10	8	24	5	11	2	18
Erigone dentipalpis	1	1		2	1	13		14	8	14		22	6	6		12
Gnathonarium dentatum													1			1
Prinerigone vagans						1		1	1	3		4		8		8
Lycosidae *		1	37	38			7	7		1	67	68		2	51	53
Hogna ferox										1	1	2		6		6
Pardosa injucunda					1	3		4	2	9		11		12	38	50
Wadicosa fidelis	10	23	5	33	4	6		10	3	8		11		1	4	5
G1	15	36		51		2		2	45	133		178		19	61	80
G2									2	6		8		6	30	36
Miturgidae																
Cheiracanthium sp.					1			1								
Philodromidae																
Thanatus albini	1	5	2	8					1	9	8	18	2	4	1	7
Salticidae *		1		1						3	2	5				
Scytodidae *Scytodes* sp.														1		1
Theridiidae *						1		1	1		1	2		1	1	2
Steatoda erigoniformis		1		1		2		2		8	1	9		15		15
Titanoecidae *										1		1		1		1
Total	28	74	39	141	8	31	7	46	73	210	87	369	51	190	58	299
Average	5.6	7.4	19.5	12.8	1.6	3.8	7	4.6	6.08	11.6	10.8	16.7	6.37	10.5	9.6	14.2
S.D.	5.8	11.5	17.5	17.6	1.2	3.7	0	4.2	11.9	29.6	21.36	37.9	5.91	15.8	18.4	21.2

Using total of 42, 42, 78 & 78 pitfall traps in winter cucumber, winter squash, summer cucumber and summer squash respectively.
J = Juveniles could not be identified to more than family level. * = Only identified to family level. TN = total number.

Table 4: Occurrence of spider families, genera and species in the other cucurbits in Al-Kanater Agricultural Research Station.

Taxa	Sweet Squash				Watermelon				Watermelon intercropped with maize				Muskmelon			
	♂	♀	J	TN	♂	♀	J	TN	♂	♀	J	TN	♂	♀	J	TN
Araneidae *					1	1	2	4								
Dictynidae *						1		1								
Dysderidae *Dysdera* sp.													1			1
Gnaphosidae *	1			1												
Micaria sp.					1			1	2			2				
Zelotes sp.	1	1		2	2		1	3	3			3		1		1
Linyphiidae *	9	2	4	13	8	12	4	24						1		1
Erigone dentipalpis	15			15	7	2		9	5	1		6	1			1
Gnathonarium dentatum		1		1					1	1		2				
Prinerigone vagans	5			5	4			4	2			2				
Lycosidae *		2	85	87	1	2	82	85			61	61	29	2	29	31
Hogna ferox	7	2	2	11	7	5		12	3			3	4			4
Pardosa injucunda	7	4	3	14	4	3		7								
Wadicosa fidelis	5	3		8	28	14		42	67	21		88	37	16		53
G1	207	116		323	138	133		271	70	31		101	31	11		42
G2	9	4	1	14	3	2		5	1			1	3	1		4
Philodromidae																
Thanatus albini	6	1	2	9	7	4	7	18	10	1	5	16	5			5
Salticidae *	7	2	2	11	7	5		12	4			4	1	1	2	4
Plexippus paykulli										1		1				
Scytodidae *Scytodes* sp.	1			1												
Theridiidae *						1	1	2							1	1
Kochiura aulica					1			1								
Steatoda erigoniformis	15		1	16	11			11	2			2		1		1
Total	293	138	100	531	230	185	97	512	170	56	66	292	83	30	32	149
Average	18.3	12.5	12.5	27.9	16.16	11.56	16.16	0.32	13.07	9.3	33	18.25	10.37	6	10.6	11.46
S.D.	48.9	32.7	27.4	71.95	29.5	31.53	29.5	0.8	23.7	12.1	28	32.17	14.21	6.18	15.88	18.03

Using total of 71, 71, 59 & 42 pitfall traps in sweet squash, watermelon, watermelon intercropped with maize and muskmelon respectively.
J = Juveniles could not be identified to more than family level. * = Only identified to family level. TN = total number.

Occurrence of spider taxa in legume crops

Results proved the occurrence of about 30 spider species and genera collected from legume fields, i.e. about 17, 15, 20, 19 and 17 species and genera from winter kidney bean, peas, broad bean, summer kidney bean and cowpea respectively (Table 2).

The highest occurrence was recorded for the unidentified lycosid genus one G_1 (67, 94 and 138 individuals in peas, cowpea and summer kidney bean respectively) followed by *Wadicosa fidelis*: 45, 72 and 184 individuals for peas, winter kidney bean and cowpea respectively.

The rarest taxa of spiders were *Lycosoides* sp. and *Dysdera* sp. in winter kidney bean, Araneidae and *Tegenaria* sp. in broad bean, *Cheiracanthium* sp. in winter and summer kidney bean, Pisauridae in broad bean, *Menemerus* sp. in summer kidney bean and *Loxosceles* sp. in broad bean and summer kidney bean. No females of *Steatoda erigoniformis* were obtained by the traps during the study period in broad bean, winter and summer kidney bean while one female was recorded in peas and another in cowpea.

Occurrence of spider taxa in cucumber and squash

Spiders of about 25 species and genera were collected from cucumber and squash in winter and summer. Identification of these spiders with their age structure and population are included in Table (3).

During the winter season, about 14 species and genera were collected. Six of them were recorded in both crops while four taxa were only collected from cucumber, of which only one individual of *Setaphis subtilis* and 8 individuals of *Thanatus albini* were recorded. Four taxa were only collected from squash, three of them, i.e. *Prinerigone vagans*, *Cheiracanthium* sp. and an unidentified theridiid, recorded the same lowest occurrence of one individual while the fourth, *P. injucunda*, was recorded by 4 adult individuals. The highest occurred taxa in cucumber and squash were the lycosid G_1 and *Erigone dentipalpis* which recorded 51 and 14 individuals respectively.

During the summer season, about 21 species and genera were recorded. Fifteen of them were collected from both cucumber and squash. Three taxa were only collected from cucumber, i.e. *Micaria* sp., *Synaphosus* sp. and unidentified salticids that were represented by 1, 1 and 5 individuals respectively. Other three taxa were only recorded from squash, each by one individual, i.e. *S. subtilis, G. dentatum* and *Scytodes* sp. The highest populations were recorded for the lycosid G_1 by 178 and 80 individuals in cucumber and squash respectively.

Total number of spiders' populations in winter and summer cucumber (141 and 369) were higher than in squash (46 and 229 individuals) respectively.

Occurrence of spiders in the other cucurbit crops

About 24 spider species and genera were recorded in the other cucurbits, of which about 16, 18, 14 and 13 species and genera collected from sweet squash, watermelon, watermelon intercropped with maize and muskmelon respectively (Table 4).

G_1 of the family Lycosidae recorded the highest occurrence in sweet squash, watermelon and watermelon intercropped with maize 323, 271 and 101 individuals respectively. The highest occurrence in muskmelon was recorded by 53 individuals of *W. fidelis*. The lowest populations were for an unidentified gnaphosid, *G. dentatum* and *Scytodes* sp. in sweet squash, an unidentified dictynid, *Micaria* sp. and *Kochiura aulica* in watermelon, an unidentified lycosid G_2 and *Plexippus paykulli* in watermelon intercropped with maize and *Dysdera* sp., *Zelotes* sp., an unidentified linyphiid, *E. dentipalpis*, an unidentified theridiid and *S. erigoniformis* in muskmelon. These recorded the same number of one individual per each.

Table 5: Seasonal abundance of spiders in the studied crops.

Taxa	Autumn	Winter	Spring	Summer
	T	T	T	T
Agelenidae *Lycosoides* sp.	-	0.08	-	-
Tegenaria sp.	-	0.08	-	-
Araneidae *	-	-	0.02	0.10
Dictynidae *	-	-	0.04	0.02
Dysderidae *Dysdera* sp.	-	0.05	-	0.05
Gnaphosidae *	0.08	0.05	0.14	-
Micaria sp.	0.04	0.10	0.08	0.65
Setaphis subtilis	0.09	0.05	0.07	-
Synaphosus sp.	-	-	0.20	-
Zelotes sp.	-	-	0.02	0.92
Linyphiidae *	0.63	1.68	4.11	0.44
Erigone dentipalpis	0.86	0.79	2.72	0.08
Gnathonarium dentatum	-	0.10	0.10	0.04
Prinerigone vagans	0.33	0.62	1.57	0.18
Lycosidae *	4.00	1.45	5.72	9.77
Hogna ferox	0.04	0.05	0.38	0.79
Pardosa injucunda	0.24	0.05	0.69	1.47
Wadicosa fidelis	5.81	4.37	3.92	19.26
G1	4.10	3.79	18.74	14.17
G2	-	-	1.21	1.17
Miturgidae *Cheiracanthium* sp.	-	0.10	0.21	-
Philodromidae *Thanatus albini*	0.73	0.28	1.80	2.24
Pisauraidae *	-	0.08	0.05	-
Salticidae *	-	-	0.38	1.34
Menemerus sp.	-	-	-	0.02
Plexippus paykulli	-	-	-	0.02
Scytodidae *Scytodes* sp.	-	-	-	0.04
Sicariidae *Loxosceles* sp.	-	-	0.21	-
Tetragnathidae *	-	1.09	-	-
Theridiidae *	0.04	0.10	0.08	0.06
Kochiura aulica	-	-	-	0.02
Steatoda erigoniformis	0.45	0.29	0.77	1.81
Titanoecidae	-	-	0.02	-
Total	17.44	15.25	43.25	54.69
Average	1.14	0.69	1.47	2.19
S.D.	1.80	1.15	3.50	4.73

* = Individuals only identified to family level. T = Total number / trap.

Seasonal abundance of spiders in the studied crops

About 33 species of 33 genera and 16 families were recorded throughout the four seasons of the year. *Hogna ferox,* G1, *W. fidelis* and *P. injucunda* (Family Lycosidae), *E. dentipalpis, P. vagans* and *G. dentatum* (Family Linyphiidae), *S. erigoniformis* (Family Theridiidae) and *T. albini* (Family Philodromidae) were the most abundant during this study (Table 5). *S. erigoniformis* was recorded for the first time from Qalyubiya governorate. However, it was previously recorded from Alexandria and Nile Delta without definite locality (El-Hennawy, 2002).

Table 6: Taxonomic list of arthropod fauna associated with spiders in investigated vegetable fields.

Class *	Order	Family	Species
Crustacea	Isopoda		
Insecta	Coleoptera	Anobiidae	*Ptinus* sp.
		Anthicidae	*Anthicuc crinitus*
		Carabidae	*Dichirotrichus* sp. *Tachys lucasi*
		Chrysomelidae	*Chaetocenema latipennis* *Hypocassida subferruginea*
		Cicindelidae	*Cicindela melancholica*
		Curculionidae	*Sitona* sp. *Temnorhinus* sp.
		Dermestidae	*Attagenus pubescens*
		Elateridae	*Drasterius bimaculatus*
		Histeridae	*Saprinus* sp.
		Mycetophagidae	
		Nitidulidae	*Carpophilus* sp.
		Scarabaeidae	*Aphodius nanus* *Onthophagous aerarius* *Pentodon algerinum* *Psammodius porcicollis* *Rhyssemus goudoti* *Tropinota squalida*
		Tenebrionidae	*Gonocephalum* sp. *Scleron orientale* *Zophosis oculosis*
	Collembola		
	Dermaptera	Labiduridae	*Labidura riparia*
	Hemiptera	Cydinidae	
		Lygaeidae	*Emblethis* sp. *Geocoris acuticeps* *Heterogaster* sp.
		Pentatomidae	*Eusarcoris inconspicuus*
	Hymenoptera	Formicidae	*Camponotus aegyptiacus* *Cataglyphis niger* *Monomorium* sp. *Pheidole megace*
	Orthoptera	Gryllidae	*Acheta domestica*
			Gryllus bimaculatus
Chilopoda, Myriapoda	Geophilomorpha	Geophilidae	
	Lithobiomorpha	Lithobiidae	
	Scutigeromorpha	Scutigeridae	

* There are different taxonomic opinions in the classification of these higher taxa.

Spring season showed the occurrence of the highest number (25) of spider taxa, followed by summer season (23), while winter recorded 21 taxa and autumn recorded the lowest number of taxa (14). This shows the high diversity of spider taxa during spring and summer. Three taxa including *Lycosoides* sp., *Tegenaria* sp. of the family Agelenidae and unidentified individuals of Tetraganthidae occurred only in winter, while titanoecids, *Loxosceles* sp. and *Synaphosus* sp. were recorded in spring.

Spiders found in the different crops showed the high occurrence of 11 taxa comprising lycosid unidentified juveniles, G_1, *W. fidelis* and *P. injucunda*; unidentified individuals of Linyphiidae, *P. vegans* and *E. dentipalpis*; unidentified individuals of Theridiidae and its *S. erigoniformis*; *T. albini* of the family Philodromidae; and *Micaria* sp. of the family Gnaphosidae. This may be attributed to their tolerance to variance in weather conditions and other ecological, biotic and abiotic variables. On the other hand, *K. aulica* of the family Theridiidae, *Scytodes* sp. of the family Scytodidae and *Menemerus* sp. and *P. paykulli* of the family Salticidae were only collected in summer in few numbers.

Survey of other arthropod fauna

Concerning arthropod fauna other than spiders, members of ten orders of the three classes, or higher taxa, Crustacea, Insecta and Chilopoda (Myriapoda) were collected with association of spiders in pitfall traps. These arthropods were presented by orders Isopoda (Crustacea), Coleoptera, Collembola, Dermaptera, Hemiptera, Hymenoptera and Orthoptera (Insecta) and Geophilomorpha, Lithobiomorpha and Scutigeromorpha (Chilopoda, Myriapoda) (Table 6).

Surveyed orders included more than 22 families of which 33 genera and 23 species were identified. The most abundant species recorded during this study were: Collembola, *Acheta domestica* (Order Orthopetra), *Camponotus aegyptiacus, Cataglyphis niger, Monomorium* sp. and *Pheidole megace* (Order Hymenoptera), *Labidura riparia* (Order Dermaptera), *Anthicuc crinitus*, *Drasterius bimaculatus*, *Gonocephalum* sp. and *Zophosis oculosis* (Order Coleoptera).

In conclusion, this study is considered a primary investigation of the occurrence of spiders and other associated arthropods in legume and cucurbit crops in the southern part of Nile Delta. However, other studies are still needed to clarify the role of these arthropods as predators of agricultural pests.

List of identified spider species

Erigone dentipalpis (Wider, 1834)
Gnathonarium dentatum (Wider, 1834)
Hogna ferox (Lucas, 1838)
Kochiura aulica (C.L.Koch, 1838)
Pardosa injucunda (O.P.-Cambridge, 1876)
Plexippus paykulli (Audouin, 1825)
Prinerigone vagans (Savigny, 1825)
Setaphis subtilis (Simon, 1897)
Steatoda erigoniformis (O.P.-Cambridge, 1872)
Thanatus albini (Audouin, 1825)
Wadicosa fidelis (O. P.-Cambridge, 1872)

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